LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

SPRING BAYOU

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Largemouth bass are managed to provide the opportunity to catch fish of greater average size. Other sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest.

Commercial

Utilization of the commercial fishery is limited at present. Spring Bayou was closed to commercial fishing in April 2009 as a measure to protect introduced triploid grass carp.

Species of special concern

No threatened or endangered species have been observed in Spring Bayou.

SPECIES EVALUATION

Recreational

Largemouth bass are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best indicator of largemouth bass abundance and size distribution. Shoreline seining has been used in the past to collect information related to fish reproductive success and forage availability. Sunfish and crappie are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish.

Largemouth bass

Largemouth bass abundance and size distribution-

Electrofishing sampling is conducted during night time hours. Shock time for each sample lasted approximately 900 seconds. The number of sample sites is determined by the total acres of a waterbody. Four electrofishing samples are conducted on Spring Bayou at locations representative of available habitat. The catch-per-unit-of-effort (CPUE) of largemouth bass collected from Spring Bayou by electrofishing from 1990 to 2011 is reported in Figure 1. CPUE has generally increased in all indicated size groups from 1990 – 1997. The decline in bass CPUE in 2000 - 2003 may be directly related to an abundance of submerged aquatic plants, especially hydrilla, which greatly limited sampling efforts. Largemouth bass CPUE began an upward trend in 2005, but a CPUE decline is noted in 2007- 2008 in all size groups (Figure 1). An expanded coverage of hydrilla is suspected as a significant influence to those results.

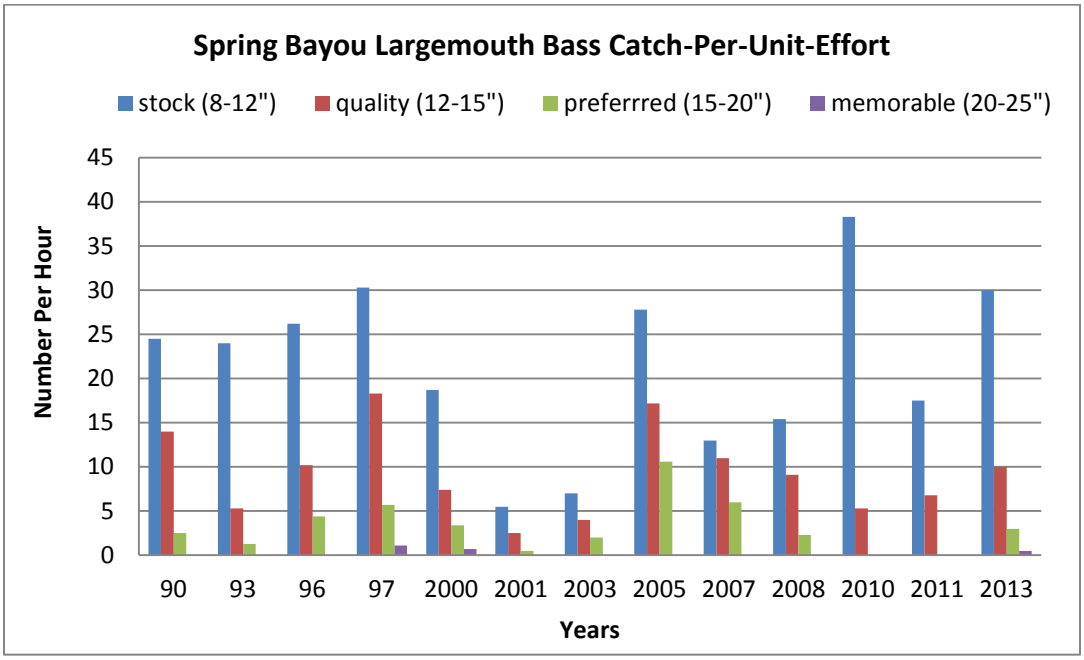

Figure 1. The spring catch-per-unit-of-effort (CPUE: number per hour) for largemouth bass of stock-, quality-, preferred-, and memorable-size fish sampled by electrofishing at Spring Bayou, LA, from years 1990 - 2013.

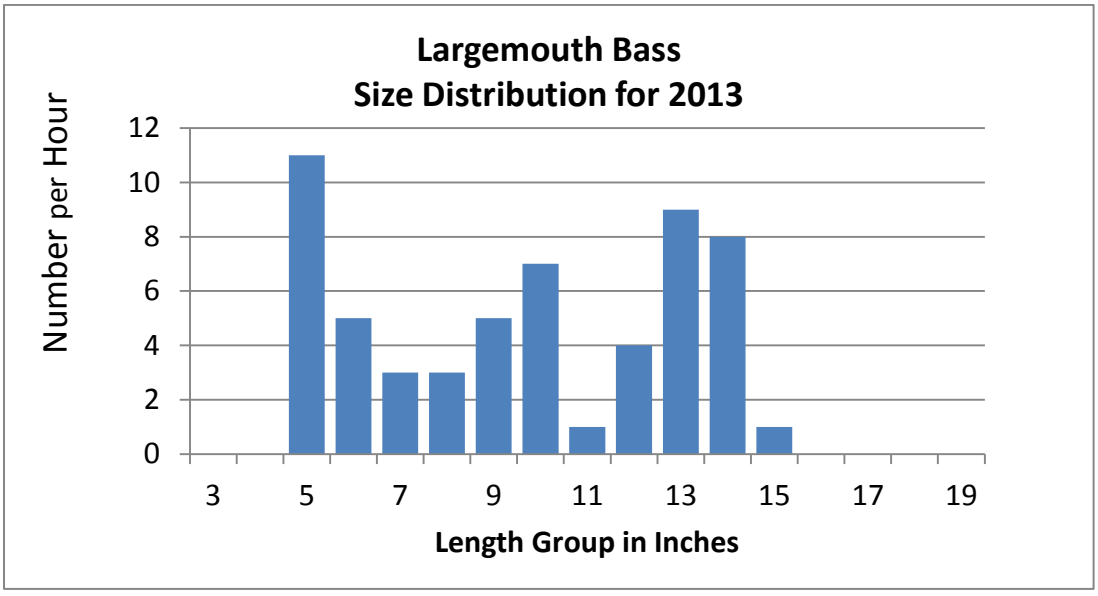

Figure 2. Largemouth bass size distribution (inch groups) from spring electrofishing samples (number sampled per hour) taken on Spring Bayou, Louisiana for 2013. N=57.

Largemouth bass recruitment has been sporadic (Figure 3). Abundance of bass exceeding 13 inches in total length is low for all three years reported. Total number of bass collected each year was very similar; 2005 = 36, 2007 = 32 and 2008 = 34.

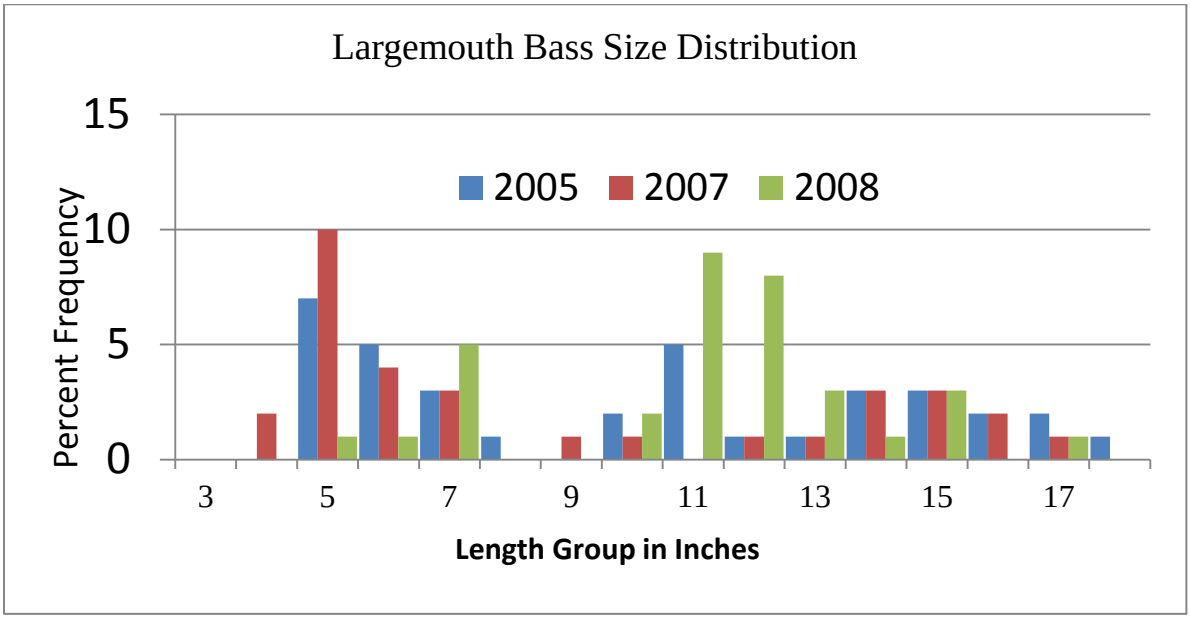

Figure 3. Largemouth bass size distribution (inch groups) from spring electrofishing samples taken on Spring Bayou, Louisiana for 2005, 2007, and 2008. N for 2005=36, N for 2007=32, N for 2008=34.

Largemouth bass genetics-

The majority of largemouth bass collected for genome determination are taken during fall standardized electrofishing samples. Five bass per inch group are collected for growth and genetics analysis. Otoliths (ear bones) and liver tissue are removed. Total length and weight is recorded for each specimen. The Louisiana State University genetics laboratory conducts starch gel electrophoresis. Genetic results for the Spring Bayou largemouth bass population are presented in Table 1. Results from samples in 1995 and 2000 indicate that native (Northern) largemouth bass is dominant in Spring Bayou. Recent genetic sampling has not been conducted due to complications related to an overabundance of hydrilla.

Table 1. Largemouth bass stockings and genetic results for Spring Bayou, LA, 1995, and 2012.

YEAR	FLMB STOCKINGS	GENETIC SAMPLING RESULTS				
		N	NLMB	FLMB	F_x	TOTAL FLORIDA INFLUENCE
1993	68,657					
1995	0	45	93%	4%	3%	7%
1999	25,156					
2000	30,757	18	83%	11%	6%	17%
2001	25,000					
2002	24,390					
2003	25,270					

2008	27,027					
2009	27,508					
2010	89,306					
2011	20,812					
2012	16,953					
TOTAL	380,836					

Largemouth bass relative weight-

Sunfish and shad (gizzard and threadfin) have been identified as primary bass forage species in Spring Bayou. During the fall sampling period, a 450 second electrofishing sample is conducted to determine forage relative abundance. Shoreline seine sampling is also conducted each summer to determine young-of-the-year production. There is a difference between forage abundance and availability. If there is an overabundance of aquatic vegetation, visual barriers created by the vegetation preclude effective feeding by predators.

Largemouth bass body conditions are analyzed to determine effective utilization/conversion of available forage. Relative weight (Wr) is a measure of fish "plumpness" and is the ratio of fish weight to that of a determined standard. The Wr is calculated by dividing the weight of individual fish by the standard weight for fish of the same length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 may indicate a potential problem with forage availability. Spring Bayou largemouth bass average near 96 Wr in all size groups indicating a healthy bass population with abundant and available forage.

Table 2. The percent by number of fish species that are ≤ five inches in total length from forage electrofishing samples from 2000 – 2011 in Spring Bayou, Louisiana.

Forage – Electrofishing Samples (% of sample)							
Year	Bluegill	Redear Sunfish	Longear Sunfish	Silversides	Gizzard Shad	Threadfin Shad	Warmouth
2000	10.3	2.6	0	0	2.6	51.3	0
2001	0	0	0	0	0	0	0
2005	23.2	0	4.7	7.0	0	0	2.3
2007	11.1	0	0	0	0	0	3.7
2008	54.6	0	0	0	0	0	0
2010	73.7	3.7	0	0	0	0	3.7
2011	48.9	17.5	0	1.2	0	0	1.2

Bluegill comprised the highest percentage of available forage from 2000 – 2011, except in 2000 as shad was the number one available forage in that year.(Table 2). Shad was not present in the following year's sample which could be attributed to an infestation of submerged vegetation and periodic fish kills.

Shoreline seine sampling is conducted in the summer months of June – August. All samples were conducted at night from one-half hour after sunset until one –half hour before sunrise. A one quadrant haul sample was taken at each station using a 25 foot long seine, six feet

deep, fitted centrally with a 6' x 6' x 6' bag and consisting of 3/16 inch Ace® nylon mesh. A total of three seine hauls were taken each year at the three boat ramps, one haul per ramp. The quadrant haul was conducted by anchoring one end of the seine at the shoreline and the other stretched perpendicular to the shoreline. The distal end was then swung around back to the shoreline, keeping the lead line tight and on the bottom. After the seine haul is completed, all fish are removed from the seine and placed into a properly marked plastic bag, which is then placed on ice. In the laboratory, fish specimens are sorted to species, enumerated, and total lengths measured in inch groups by total number. Species collected in Spring Bayou consisted of sunfish, largemouth bass, shad, silversides and golden shiners. Bluegills were the predominant forage species collected in seine hauls (Table 3).

Table 3. Total numbers of all fish species $\leq$ 5 inches in total length captured by seine hauls from Spring Bayou, LA, 1990 – 2010.

Total Number By Species								
Year	Bluegill	Other sunfish	Silversides	Golden Shiners	Gizzard Shad	Threadfin Shad	Mosquito Fish	Yellow Bass
1990	141	107	355	0	58	162	279	89
1991	279	169	969	30	22	16	1467	169
1993	686	157	1444	46	77	218	527	30
1994	359	139	695	79	1	98	84	36
1995	415	168	328	21	74	232	96	36
1996	622	424	690	42	133	717	134	37
1998	110	51	0	30	174	4	84	102
2003	184	103	502	25	45	19	141	0
2007	12	0	4	0	0	0	261	0

Forage was comprised mainly of gizzard and threadfin shad, 6 inches TL or less during the 1980's. An average of three 1-acre biomass (rotenone) samples/year is shown in Figure 4 below. Rotenone sampling typically used to monitor forage populations has been limited due to the excessive amount of aquatic vegetation (hydrilla) in the lake. The infestations block out suitable areas in which to place the block-off net. Increasing hydrilla infestations, in the most recent year of sampling (2007), reduced the biomass (pounds/acre) of available forage by more than 50% to the lowest level recorded.

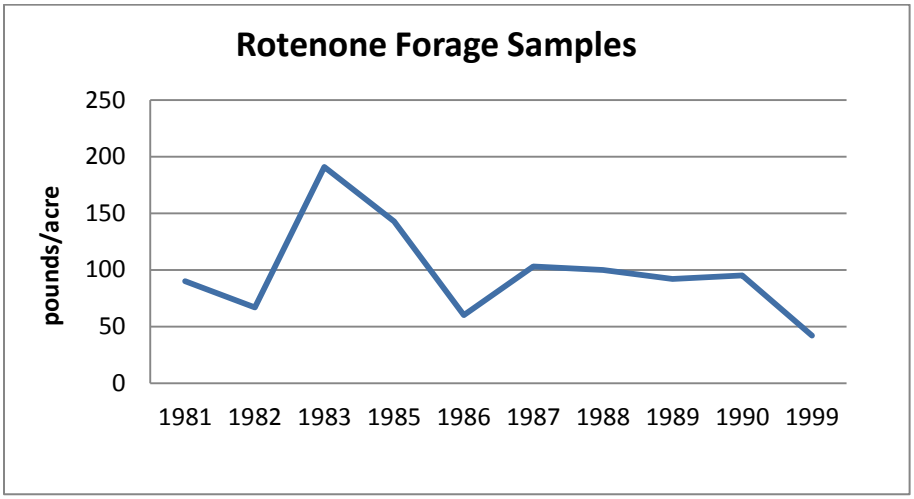

Figure 4. Forage samples (≤ 6 inches TL) from standardized biomass (rotenone) samples taken in Spring Bayou, Louisiana from 1981-1999.

Crappie

Abundance and size distribution-

LDWF crappie sampling CPUE remained low from 2000 – 2003, then increased in 2005 (Figure 5). From 2000 – 2003 numbers were extremely low which can be related to the drought of 1999/2000 causing low water levels and related fish kills. Increase predation is also likely. In 2005, abundance increased in all size groups which could be related to a high recruitment rate and immigration of fish from other areas. In 2008, results indicating abundance are likely biases due to excessive submerged vegetation. In 2010 and 2011 sampling results showed a generous increase in quality- and preferred-size classes of crappie.

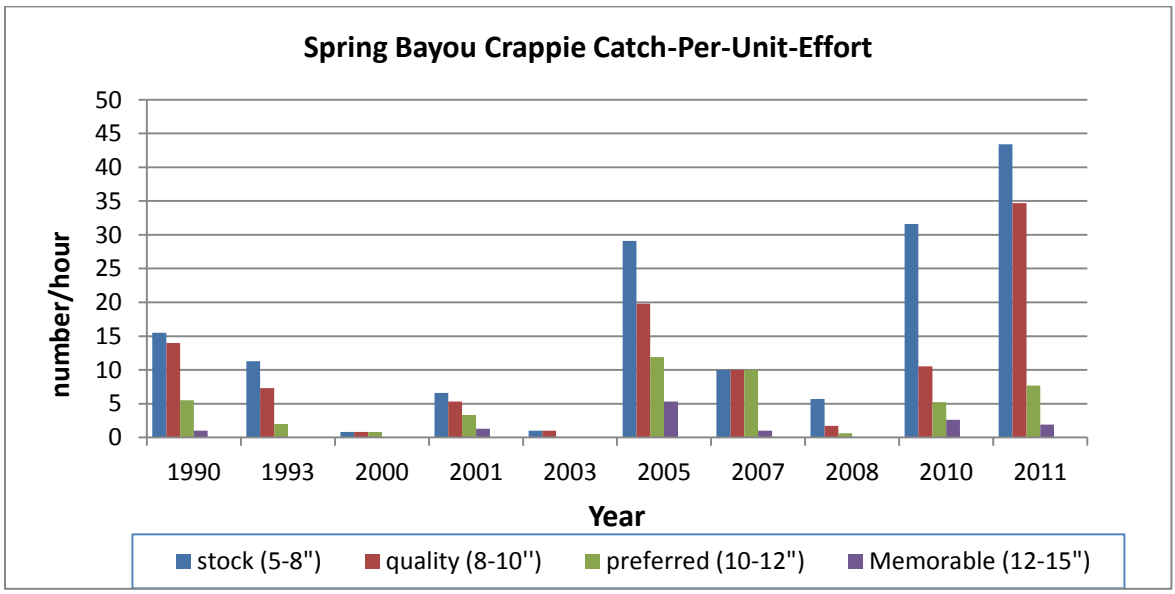

Figure 5. Crappie relative abundance (CPUE: fish per hour) from fall electrofishing at Spring Bayou, LA, for the years 1990 - 2011.

The size distribution of crappies collected in Spring Bayou using lead nets during 2012 is shown in Figure 6. Total catch is sorted by inch groups to provide a size distribution model of the population at the time of sampling. The fall 2012 length distribution of the crappie population ranged from 2-16 inches with strong representation of the 7-12 inch groups. The majority of the crappies captured consist of black crappie. The total number of crappie collected was 465 taken in four different sample locations. The total soak (fishing) time of the lead nets was approximately 48 hours. The increase in total number of crappie captured may have been related to the 2011 Mississippi River flood, which inundated the complex thereby improving crappie recruitment and forage availability. The 2012 season marked the first time lead net samples were taken in Spring Bayou. Because this gear is very efficient at capturing crappies, future samples will be taken utilizing lead nets to assess populations.

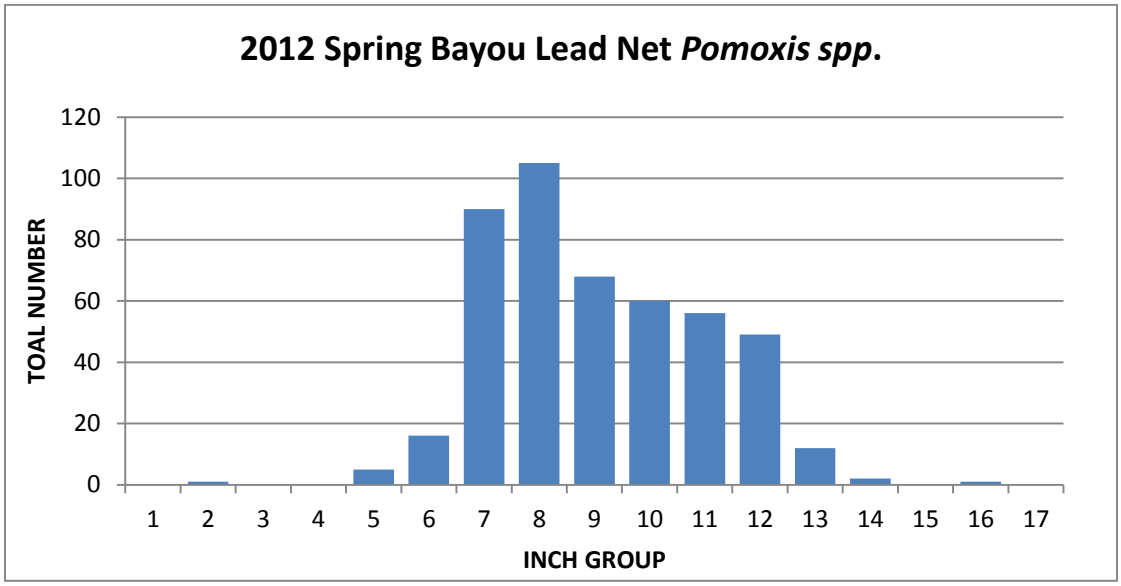

Figure 6. The size distribution (inch groups) of crappie captured in lead net samples at Spring Bayou, Louisiana in the fall of 2012. N=465.

Commercial

Historically, commercial fishing activities were allowed year round Monday through Friday except for hoop net and slat traps that were allowed any day of the week. Permits were issued by LDWF to applicants to harvest commercial species (Figure 7). The increasing hydrilla infestation reduced the permitted harvest of commercially important species of fish to less than 10% of historic harvest. Beginning in January 2009, commercial fishing activities were prohibited. This was due to the introduction of 21,215 triploid grass carp (TGC) to help control the spread of hydrilla in Spring Bayou.

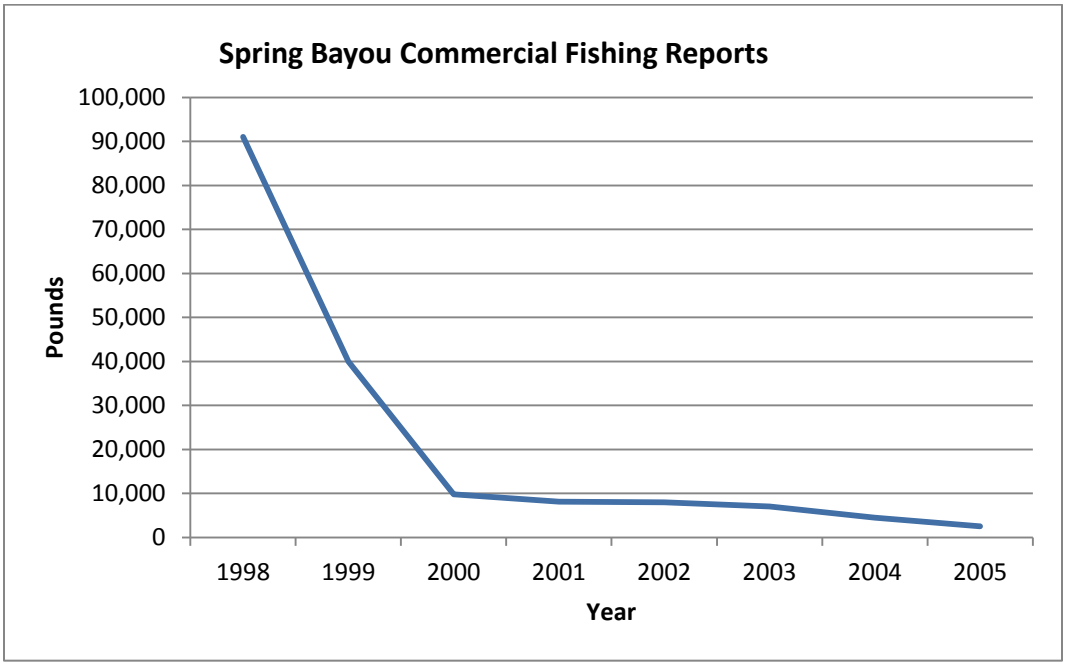

Figure 7. Landings in total pounds from commercial fishing reports for Spring Bayou, LA from 1998 – 2005. Commercial species such as common carp, buffalo, bowfin and freshwater drum accounted for species captured.

LDWF Standardized sampling includes monofilament gill nets of 2.5 inches, 3.0 inches, 3.5 inches and 4.0 inches set between December 1 and February 28. The minimum number of net sets is determined by the surface area of the impoundment. A net set consist of four, 100 yard nets of the specified mesh sizes. Gill nets are set within one hour of sunset and retrieved as soon as possible after sunrise the following morning. All fish captured are individually measured to total length (millimeters) and weight (grams).

The most common species sampled in 2011 were buffalo and bowfin. Other species noted were the triploid grass carp (TGC), which were stocked in Spring Bayou in 2008 and 2011 to control the spread of hydrilla (Table 4).

This back water system is influenced by Red River spring flood. Commercial fish species enter the complex and increase their population. As shown in Table 4 in 1997 and 2011, high water events resulted in increased abundance of commercial species.

Table 4. Total number of species captured per year with monofilament gill nets fished on Spring Bayou, LA during 1990 – 2011.

Species	1990	1991	1992	1993	1994	1995	1997	2002	2011
LMB			15	3	8	17			1
White Crappie	1	13	7	2	3	15			
Black Crappie		7	2	1	1	17	2	4	1
Common Carp			19	8	20	19	29	3	4
Channel Catfish			2	1	4	1	2	1	
Blue Catfish	1			2	3	17		1	1
Bullhead					3	2	2	3	7
Bigmouth Buffalo			42	31	76	92	267	19	178
Smallmouth buffalo			10	8	18	15	67		32
Freshwater Drum			7	13	5	6	9		
White Bass		5		2			2		
Bowfin		44	31	32	34	93	25	3	43
Spotted Gar				3		6	6		
Gizzard Shad			9	7	5		21	2	3
Flathead Catfish					1				
Grass Carp									66
Silver Carp									5

Creel Surveys

Access point creel surveys are conducted on water bodies to collect fishery dependent data from anglers including: fishing pressure, catch rates, harvest, and size structure of harvested fishes, angling success and species preference.

Table 5. Average number of largemouth bass anglers interviewed, time fished and distance traveled to Spring Bayou, LA during the 1989, 1992 and 2009 creel surveys.

BASS ANGLERS State regulations – no minimum/10fish creel			
Year	Mean no. of anglers in party	Mean trip length (hours)	Mean one-way distance traveled to ramp
1989	1.6	4.04	14 miles
1992	1.72	3.73	11 miles
2009	1.92	2.49	15 miles

Bass anglers on Spring Bayou averaged four hours per trip fishing after having driven approximately 15 miles to the ramp where they launched their boat in the 1989 survey. In 1992 average trip length fell to 3.73, but the creel survey was cut short when Hurricane Andrew hit the Atchafalaya Basin causing major fish kills. Fishing effort was extremely low during the remainder of 1992 following the hurricane. In the 2009 creel survey, average trip length fell to 2.49 hours. Fish kills caused by Hurricane Gustav in 2008 contributed to

reduced angler catch as well. Participation by local largemouth bass anglers (Avoyelles and Rapides Parishes) made up the majority of fishermen interviewed.

Tables 6, 7, and 8 below report the number of largemouth bass caught, released and harvested per trip by month during the 1989, 1992 and 2009 surveys. Catch rates were found to be the highest in the month of July in 1989. Number of bass harvested (431) is just above the number of bass released (429). In the 1992 survey, catch rates were highest in June and July with the average weight of bass to near 1.66 pounds. From August – December, no creel surveys (NC) were conducted due to Hurricane Andrew and related fish kills.

The average weight of a largemouth bass caught in the 1989 creel survey was 1.62 pounds. In the 2009 creel survey, angler catch was much reduced, likely due to excessive hydrilla and Hurricane Gustav induced fish kills.

Tables 6, 7, and 8. Largemouth bass caught, released and harvested per trip by anglers on Spring Bayou, LA, during the 1989, 1992 and 2009 creel surveys. NC = no creel conducted. Minimum length limit = MLL.

Table 6.

State regulations – no MLL/10 fish creel (1989 Creel Survey)				
Month	LMB caught / trip	LMB released / trip	LMB harvested / trip	Ave. weight
1	1.45	0.86	0.59	1.31
2	0.91	0.76	0.14	1.82
3	1.04	0.64	0.40	1.60
4	1.90	1.5	0.34	1.88
5	0.88	0.38	0.50	1.56
6	1.61	1.17	0.44	1.24
7	5.59	3.07	2.51	1.09
8	2.58	0.88	1.70	1.49
9	2.63	1.50	1.13	1.18
10	2.95	0.90	2.05	1.39
11	3.11	1.19	1.92	1.16
12	0.55	0	0.50	3.75

Table 7.

State regulations – no MLL/10 fish creel (1992 Creel Survey)				
Month	LMB caught / trip	LMB released / trip	LMB harvested / trip	Ave. weight
1	0	0	0	0
2	1.41	1.18	0.22	1.82
3	0.67	0.27	0.44	1.60
4	0.74	0.17	0.56	1.88
5	2.51	1.59	0.92	1.71
6	2.82	1.66	1.16	1.40
7	2.89	1.88	1.01	1.58
8	NC	NC	NC	NC
9	NC	NC	NC	NC
10	NC	NC	NC	NC
11	NC	NC	NC	NC
12	NC	NC	NC	NC

Table 8.

State regulations – no MLL/10 fish creel (2009 Creel Survey)				
Month	LMB caught / trip	LMB released / trip	LMB harvested / trip	Ave. weight
1	0	0	0	0
2	0.42	0.38	0.11	1.71
3	0.14	0	0	0
4	0	0	0	0
5	0	0	0	0
6	NC	NC	NC	NC
7	NC	NC	NC	NC
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0

Although largemouth bass and crappie only averaged 19% and 16%, respectively, of total fish harvested for Spring Bayou, these two species are most pursued by Spring Bayou fishermen. During 1989, bluegill was the most abundant species harvested (61%) by anglers (Figure 8) throughout the creel year.

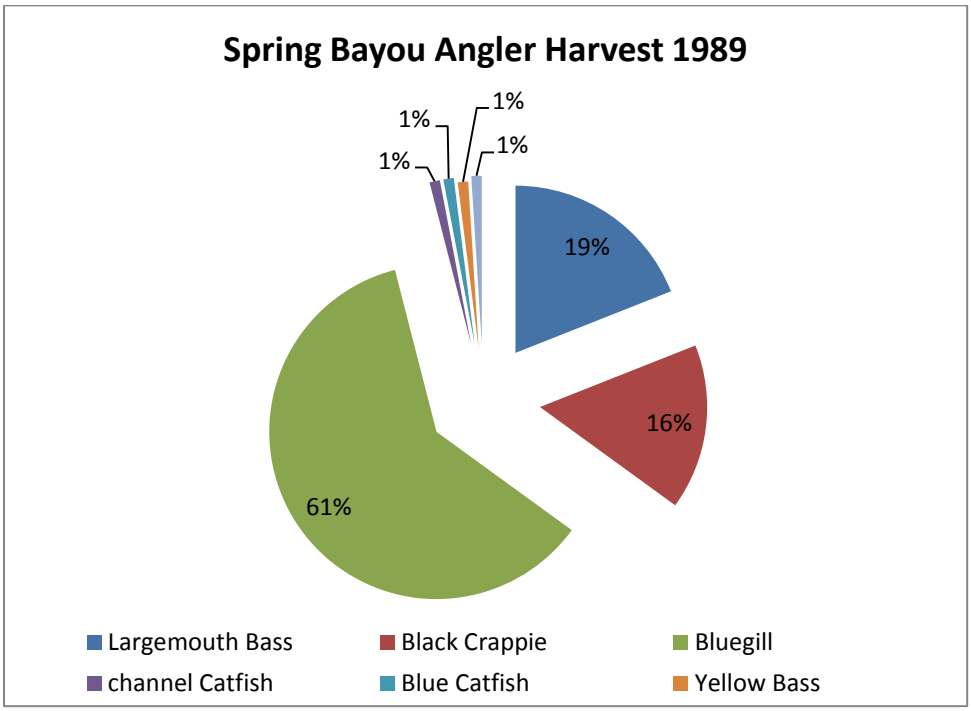

Figure 8. The percentage (%) by number of total fish species harvested by anglers from Spring Bayou, LA during the 1989 creel survey.

Bluegill was the most abundant species (45%) harvested during the 1992 creel survey as shown in Figure 9 below. This was followed by black crappie (19%), largemouth bass (17%) and warmouth at 12%.

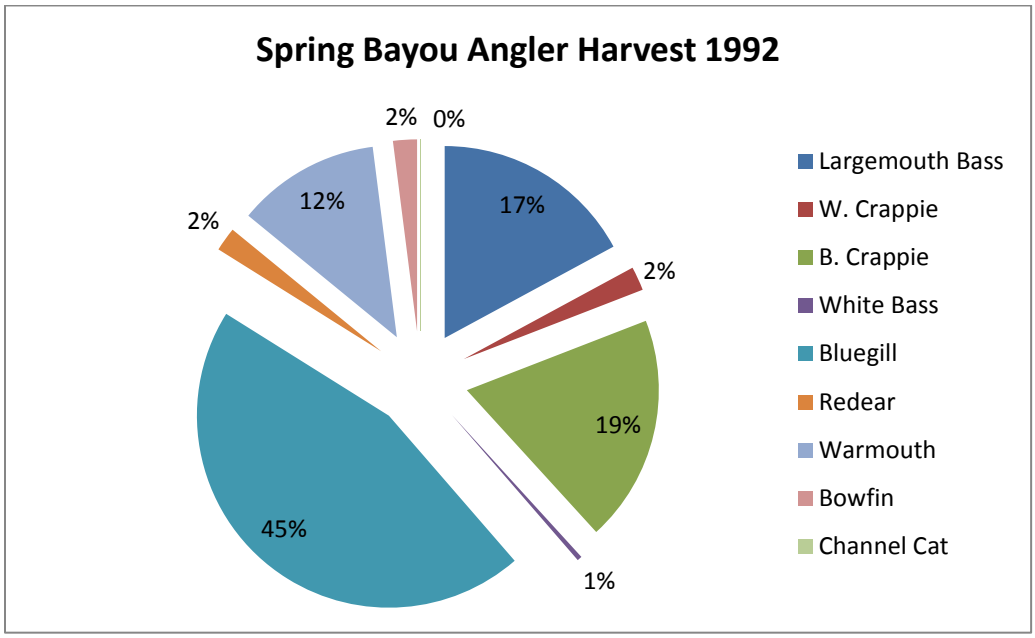

Figure 9. The percentage (%) by number of total fish species harvested by anglers from Spring Bayou, LA during the 1992 creel survey.

Very few largemouth bass were harvested (1%) by anglers in the 2009 creel survey (Figure 10). Bluegill (54%) followed by black crappie (25%) were the two most abundant species. In lesser numbers harvested were redear sunfish (9%), warmouth (8%), followed by white crappie at 2%.

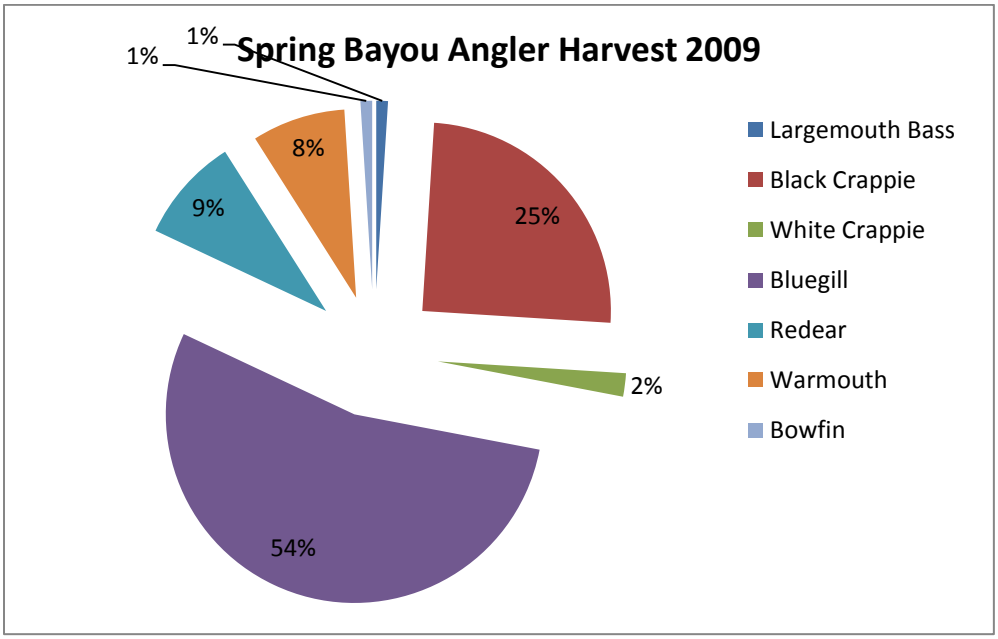

Figure 10. The percentage (%) by number of total fish species harvested by anglers from Spring Bayou, LA. during the 2009 creel survey.

During Spring Bayou creel survey interviews in 2009, anglers were asked their opinion of current bass regulations. If the angler expressed disagreement with the regulation, they were

asked to provide suggestions for change.

Table 7 below shows the results of those opinion questions. These results were compiled from largemouth bass anglers only. Highest percentage of approval (70%) was expressed for current regulations. Anglers who did not primarily pursue bass also responded with high approval of the current regulations. The majority of fishermen agreed with current largemouth bass regulations. During the 1989 and 1992 creel survey an angler opinion survey was not conducted.

Table 9. Results of an angler opinion survey taken at boat ramp access points on Spring Bayou, LA during the 2009 creel survey.

Angler Opinion Survey Results		
Preference	Bass Anglers	All Anglers
	2009 n = 23	2009 n = 101
No length restriction	71%	91%
14" minimum	10%	0
12" minimum	14%	2%
No opinion	0	5%
14-17 slot limit	0	1%
Other Slot	2%	0
Other regulation	0	0
Other minimum	3%	1%

Sunfish species made up the greatest percentage of fish harvested in Spring Bayou during 1989, 1992 and 2009 (Table 10). Bluegill were most common, followed by warmouth and redear sunfish.

Table 10. Percent by number of common sunfish species harvested by anglers on Spring Bayou, LA, during the 1989, 1992 and 2009 creel surveys.

Year	Bluegill	Redear Sunfish	Warmouth	Longear sunfish
1989	99%	0.002%	0.002%	0.001%
1992	76%	3%	20%	1%
2009	76%	12%	12%	0

Crappies were harvested in the majority of the months during the 1989 creel survey (Figure 11). In the 1992 survey, crappie harvest was highest in February, followed by May and June. From August – December, no creel surveys were conducted on Spring Bayou due to Hurricane Andrew. District personnel were assisting in the fish kills within the Atchafalaya Basin and continued to monitor fish populations for that year. In the 2009 survey, crappies were caught in the later part of the year especially during the August – October timeframe. Crappie numbers may have shown an increase in the 2009 survey, but due to personnel assisting another district with fisheries activities, the months of June and July were not surveyed. In later months of the creel survey, crappie harvest was minimal.

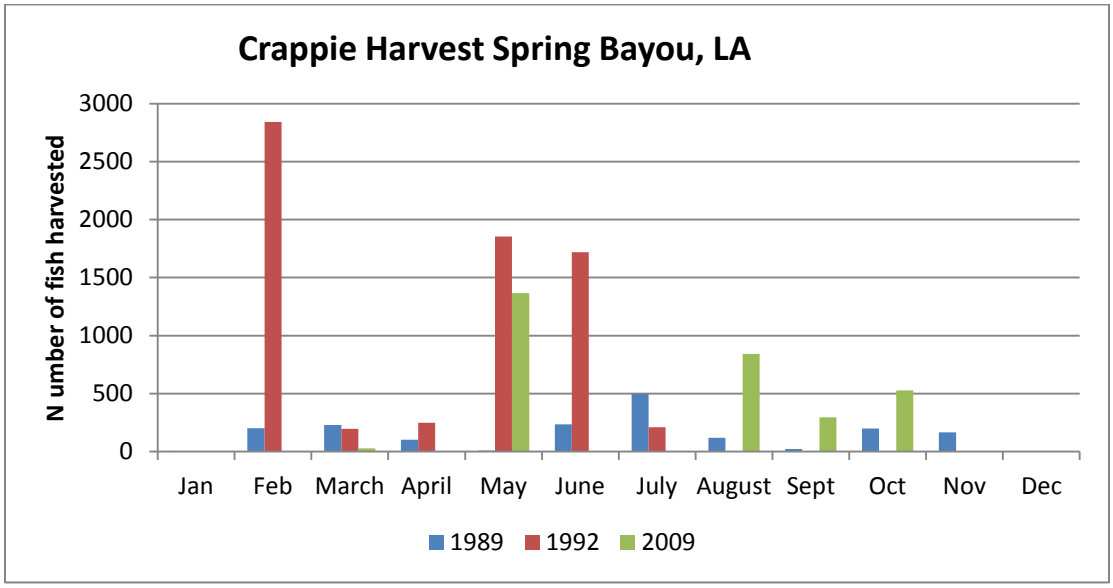

Figure 11. The total estimated number of crappies harvested by month and year by anglers on Spring Bayou, LA, during the 1989, 1992 and 2009 creel surveys.

Water Quality

Water quality parameters such as dissolved oxygen, temperature, pH, conductivity and depths were measured concurrent with other standardized sampling efforts, drawdown events and monthly site visits. As shown in the Figure 12 below, dissolved oxygen (DO) levels often fell below 2.0 mg/l on the lake bottom from 2005 – 2012. This is due to excessive amounts of submerged vegetation such as hydrilla. In 2005 and 2008, surface and bottom readings fell below 2.0 mg/l due to the effects of Hurricanes Rita and Gustav. In 2011, dissolved oxygen levels fell well below 2.0 mg/l when Mississippi River floodwaters placed an additional 4 feet of water in Spring Bayou. Hypoxic conditions and fish kills occurred.

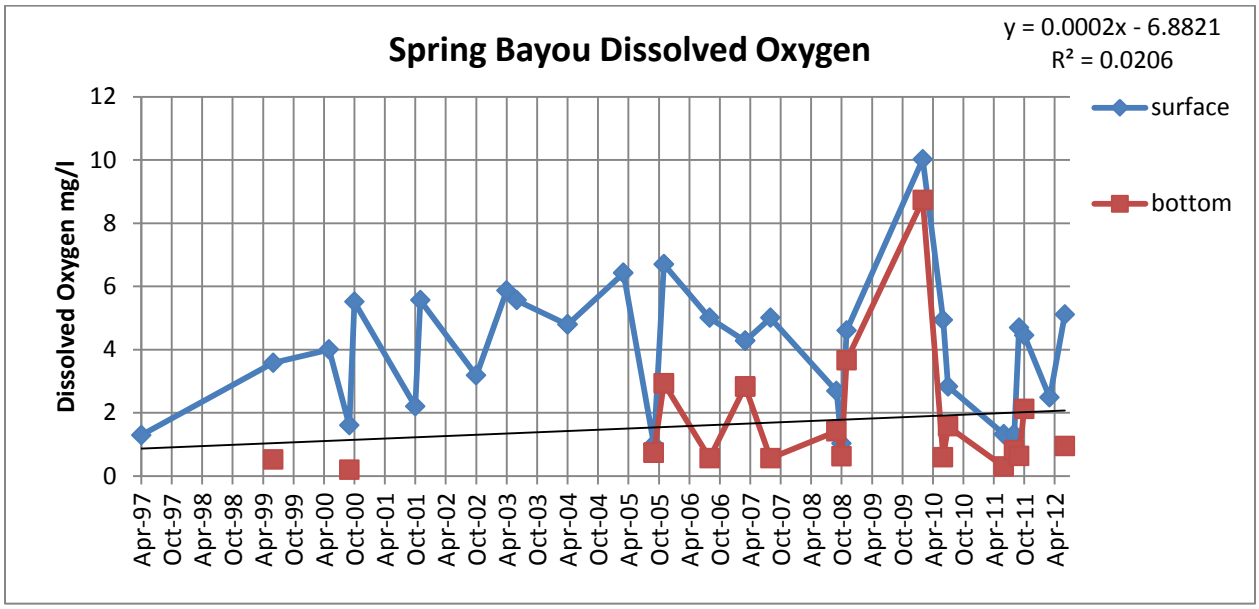

Figure 12. Dissolved oxygen measurements taken during standardized fisheries and random sampling events from Spring Bayou, Louisiana, during the years 1997 – 2012.

HABITAT EVALUATION

Aquatic Vegetation

Aquatic vegetation has historically restricted Spring Bayou boating and angler access. In 1994, hydrilla was discovered. The plant covered 75% of the surface area of Spring Bayou in a 2 year period. A 1996 fall drawdown was unsuccessful due to high water. A 1997 summer/fall drawdown provided limited control. The herbicide (Sonar®) has been used to control hydrilla. At present, hydrilla has over taken the major tributaries of this lake. Small amounts of herbicide are still applied with some control and triploid grass carp have been stocked to reduce hydrilla infestations. Drawdowns recommended by LDWF after 1997 were not supported by local public.

In 2008, foliar herbicide applications were made on nuisance plants such as water hyacinth, duckweed, pennywort, American lotus, alligator weed, cut grass, frog's bit, parrot feather, sedge, and common salvinia in areas used by recreational fishermen. The herbicide 2,4-D was applied at a rate of 0.5 gallons per acre to control water hyacinth, pennywort, alligator

weed, and American lotus. Diquat (Knockout® and Reward®) was applied at a rate of 0.75 gallons per acre for duckweed, frog's bit and parrot feather, and glyphosate (Aquamaster and Aqua Star) at a rate of 0.75 gallons per acre to control common salvinia and sedge.

In 2009, foliar herbicide applications were made on nuisance plants such as water hyacinth, duckweed, pennywort, American lotus, alligator weed, cut grass, frog's bit, parrot feather, primrose, sedge and common salvinia in Spring Bayou. To control water hyacinth, pennywort, alligator weed, primrose and American lotus, 2,4-D was applied at a rate of 0.5 gallons per acre. Diquat was applied at 1.0 and 0.75 gallon per acre rates for duckweed, frog's bit and parrot feather, and glyphosate and imazamox (Clearcast) each at 0.75 gallons per acre to control common salvinia and sedge.

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In January 2008, 11,215 triploid grass carp (TGC) were stocked in Spring Bayou to reduce hydrilla. Of these TGC, fifty fish were implanted with transmitters, and telemetry equipment to track their movements. In August 2008, Hurricane Gustav caused heavy flooding, low dissolved oxygen levels and fish kills. Another attempt to stock TGC began in March of 2011, when 10,000 carp were stocked in Spring Bayou. Of these, ten fish were implanted with transmitters and were tracked for approximately 20 months. After this stocking, flood waters increased lake level by three feet. The deterioration of inundated vegetation caused low dissolved oxygen levels throughout the system. More fish kills occurred.

In 2009, a total of 614 acres of hydrilla in Spring Bayou were treated using the systemic herbicides Sonar Q (quick release) and Sonar PR (precision release). Areas treated were Tete De Bouef (75 acres), Lac a Deux Boute (97 acres), Coulee Noir (235 acres) and Tee Lac (208 acres). In Tete De Bouef and Lac a Deux Boute only, Sonar PR was applied totaling 1,170 pounds at a rate of 6.8 ppb. The other two areas were treated with a mix of Sonar PR and Sonar Q. Applications of both Sonar formulations were 840 pounds each for a

concentration of 3.8 ppb. Results were poor in Coulee Noir and Tee Lac but good in the other two areas.

In 2010, an experiment combining a systemic herbicide (Galleon®) with a contact herbicide (Aquathol K) was attempted to control the spread of hydrilla. Total Galleon used was 45 gallons and a total of 1,080 gallons of Aquathol K were used. Galleon was applied at a rate of 20 ppb and Aquathol K at a rate of 1 ppb. Areas treated were Old River, Boggy Bayou, Coulee Noir and Lac a Deux Boute. Success of the Galleon/Aquathol treatment was spotty, with submersed plants returning to pre-treatment levels in most of these areas by 2011. Also, a Sonar application was implemented to compare with the experiment. The area treated was in Tete de Bouef (75 acres) with 510 pounds of Sonar PR for a rate of 6.8 ppb. The result from the Galleon/Aquathol treatment was fair, initially reducing the hydrilla biomass, but the plant re-growth was fast. Results from the Sonar application were good as hydrilla re-growth was minimal and continues to subdue the growth of this plant.

In May 2011, a total of 115 acres of hydrilla in Spring Bayou were treated using the systemic herbicides Sonar PR & Q. Areas treated were Old River (70 acres) and Boggy Bayou (45 acres). In Old River, the total Sonar PR & Q applied was 480 pounds for a concentration of 3.42 ppb. In Boggy Bayou the total Sonar PR & Q applied was 270 pounds for a concentration of 3.33 ppb. The herbicide was applied 14 days prior to the 2011 flood event that caused water levels in the lake to rise 3 feet above pool stage. Even with that amount of water flowing through the system, results were good as hydrilla growth has been reduced and remains that way in Old River, but in Boggy Bayou hydrilla returned the following year.

In May 2012, a total of 250 acres of hydrilla in Grand Lac were treated using the systemic herbicides Sonar PR & Q. The total Sonar PR & Q applied was 480 pounds for a concentration of 3.42 ppb. Monthly site investigations were made and results were good as hydrilla growth has been reduced in this area.

Contact and systemic herbicides have both been used to combat the spread of hydrilla in Spring Bayou. Successive annual applications of systemic herbicides have reduced hydrilla growth in the treated areas. As of October 2012, hydrilla covered approximately 2,000 acres throughout the complex. Water hyacinth, pennywort, primrose and alligator weed covered approximately 1,000 acres; common salvinia and American Lotus covered approximately 950 acres, and duckweed and frog's bit covered approximately 500 acres.

Plant growth projections for 2013:

Hydrilla - up to 2,174 acres (80%) widely scattered over the lake.
American Lotus – up to 950 acres widely scattered over the lake
Alligator weed, Primrose, Water Hyacinth & Pennywort - up to 1,000 acres mixed together and located primarily along shoreline on the lower end.
Common Salvinia - up to750 acres located primarily in the center of the lake.
Duckweed & Frog's Bit - up to 500 acres located primarily along shoreline on the upper end.

Substrate

Excessive accretion has reduced the quality of nesting substrate in Spring Bayou. Accretion rate has increased markedly with the introduction of invasive aquatic vegetation.

CONDITION IMBALANCE / PROBLEM

1. The natural water fluctuation cycle of Spring Bayou (i.e., spring flood pulse and fall low water) was altered in 1955 with the construction of the spillway on the Little River.

2. Benefits of the natural water fluctuation cycle (i.e., increased sportfish nesting success and aquatic vegetation control) have been compromised.

3. Invasive species including hydrilla, common salvinia and water hyacinth have been introduced into Spring Bayou.

4. With limited natural control, aquatic vegetation coverage remains at levels considered to be harmful to sport fisheries and to angler access.

5. Lake drawdowns to mimic natural water level fluctuation are unpopular with users of Spring Bayou.

6. Physical limitations reduce water flow and increase time necessary to dewater the Spring Bayou system. Time necessary for drying substrate is limited to the degree that benefits are minimized.

CORRECTIVE ACTION NEEDED

1. Re-establishment and/or simulation of the natural water fluctuation cycle could provide substantial improvements to habitat, sportfish populations, and angler access.

2. Dredging is necessary to allow adequate water flow for water fluctuation. Areas that require dredging are Boggy Bayou and a portion of Little River.

3. Increased public information efforts are needed to explain the benefits of water fluctuation and the application necessary to achieve a healthy Spring Bayou.

4. All available control measures must be applied in the effort to control excessive aquatic vegetation in Spring Bayou.

RECOMMENDATIONS

1. An approach of integrated control measures (chemical, physical, and biological) is recommended to manage aquatic vegetation in Spring Bayou. The advantage of a combined approach is the ability to achieve benefits from several control methods and not be completely dependent on the success of any one approach.

2. Herbicide applications will continue to be conducted as per the standard operating procedure for the application of herbicides by LDWF aquatic plant control personnel. Granular herbicide, SONAR PR and Q will be applied in the immediate vicinity of boat launches in Spring Bayou. Aquathol® K or Clipper™ will be used on an experimental basis to clear access routes. Proposed access lanes will be located in areas listed below. These lanes will be treated once during the late spring or early summer of 2013 and will be monitored throughout the growing season. Results will determine if similar treatments are conducted in the future. Contact herbicides will be applied as necessary to control floating and emergent vegetation.
   a. Coulee Noir (6 acres)
   b. Lac a de Boute to Grand Lac (18 acres)
   c. Tee Lac (11 acres)

3. Triploid grass carp (TGC) will be stocked at a rate of 10 fish per vegetated acre for the next 3 years (2013-2015). The successive introductions are necessary to achieve desirable submerged vegetation coverage for sport fisheries and angler access. To reduce initial predation, TGC will be at least 12 inches in length at stocking.

4. Dredge as necessary in Boggy Bayou and Little River to facilitate water flow and to increase effectiveness of fall drawdowns.

5. Water level fluctuation is an important tool for lake management. Drawdowns mimic natural low water periods of the fall and can provide many of the same benefits including aquatic vegetation control and fish population management. Cooler water temperatures in the fall also reduce the potential for fish kills. Consistent drawdown regimes will allow the introduced TGC to reduce hydrilla infestations. Therefore, it is recommended that a drawdown of four feet below pool stage (37 msl) be conducted every 3 years, beginning the day after Labor Day starting in 2014. The target water level is to be maintained until the end of December, when the gates will be closed to allow the lake to refill. The lake will remain open for recreational activities during drawdown.

6. Continued sampling will be conducted to monitor fisheries and aquatic vegetation status.